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VALVE AND MICROPHONE BASE ASSEMBLY

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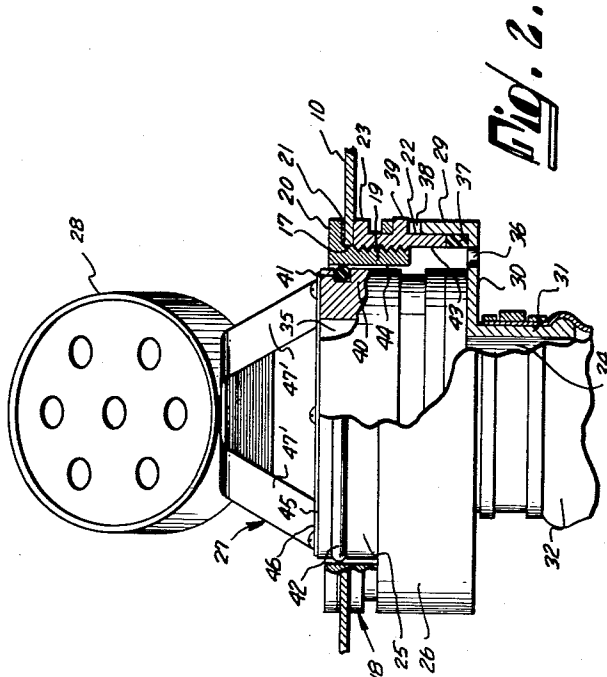


Fig. 2.

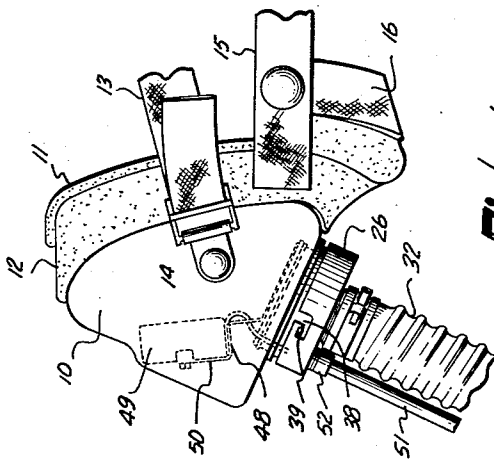


Fig. 1.

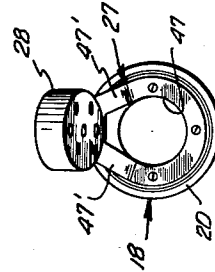


Fig. 3.

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VALVE AND MICROPHONE BASE ASSEMBLY

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2 Claims. (Cl. 128—146)

The invention relates to breathing and anesthesia equipment and has special reference to a mask adapted to be fixed to the wearer over the nose and mouth and to which there is secured a subassembly containing both a breathing valve and a microphone mounting in such relationship that it can be connected and disconnected from the mask as a unit.

The demands of high altitude flying in the past decade have accelerated to a great degree the design and development of sundry types of breathing masks of a particularly dependable type such that they can be worn by a pilot actively engaged in the manipulation of an airplane. Such masks, however, must always have an oxygen line connected thereto and some difficulties have existed in providing a proper connection between the mask and the oxygen supply which is dependable at all times, but which also may be capable of being connected and disconnected when the pilot has need to leave his station, without prospect of damaging any of the equipment. A popular solution, heretofore, has been to so construct an oro-nasal mask that the air valve and microphone and its mounting remain part of the mask, the mask being so equipped that cables and an oxygen supply line can be connected and disconnected therefrom, thereby permitting the pilot to leave his station with the entire mask and its internal equipment. This solution, however, has presented many drawbacks. The pilot's mask, the term "pilot" being used also to include any such person who might be found using the mask on the airplane, is ordinarily considered as personal property, and it is of such nature that many occasions arise wherein proper care of the mask is neither convenient nor possible. As the mask is worn about, flopping to and fro where a delicate microphone is carried in the mask together with critical breathing valves, the microphone and equipment have often been prone to get out of order frequently. This may not be discovered in advance of flight time, and sometimes not discovered until the flight is under way to the point where a ready exchange of mask equipment is not readily possible.

To keep such microphones and breathing equipment in proper condition, necessitates frequent checking and servicing. Such checking and servicing is not always dependable when the equipment remains in the possession of the pilot. Hence, it becomes highly desirable to have such equipment fastened to the pilot's station in the airplane, so that all of the breathing and electrical equipment can be checked together and their effectiveness made certain in advance of flight time. With the types of oro-nasal masks heretofore employed, this has necessitated leaving the entire mask for checking. Many times pilots have a reluctance to use masks belonging to others and with just reason because the fit of the mask on one face may not be adequate for the fitting upon a face of different size and proportions.

To circumvent these sundry drawbacks, it is among the objects of the invention to provide a new and improved breathing and anesthesia mask of such design and con-

struction that the air valve and microphone may be readily and conveniently removed from the mask for subsequent replacement, thereby permitting the owner of the mask to carry with him the mask itself without being encumbered by mechanical equipment.

Another object of the invention is to provide a new and improved breathing and anesthesia mask which is equipped with a microphone and breathing valve assembly or sub-assembly constructed as a unit and arranged in such fashion that the unit can be inserted in the mask for use and readily removed therefrom after the use has been satisfied.

Still another object of the invention is to provide a new and improved breathing and anesthesia mask apparatus which is provided with a special sealing attachment conveniently located in the shell of the mask, and to which there is removably attached, a microphone and breathing valve unit of such size, proportion and construction that the unit be inserted into the shell of the mask through a suitable opening, and there temporarily locked in place forming a secure seal but in such manner that the unit can be released and removed at a moment's notice by a mere twist of the connection between the parts.

Still further among the objects of the invention, is to provide a new and improved anesthesia and breathing mask combination wherein a microphone and breathing valve is specially mounted upon a valve base of such character that it entirely encompasses a complementary connection on the shell of the mask to which it can be releasably attached in a manner giving assurance of a multiple, positive seal of cushion character between those parts where an effective seal is requisite.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view of a breathing and anesthesia mask showing the location of a microphone and breathing valve unit therein.

Figure 2 is a longitudinal view, partially in section, showing the connection of the microphone and breathing valve unit to the mask.

Figure 3 is a plan view of the parts in the position shown in Figure 2.

In a form of the invention chosen for the purpose of illustration, there is shown a pilot's breathing mask apparatus comprising an oro-nasal shell 10, provided with a face gasket seal 11 around the perimeter spaced from the shell by employment of a sponge rubber connection. A strap 13 secured to the shell in somewhat conventional fashion by a snap connection 14 is employed together with a neck strap 15 which is attached to the sponge rubber connection together with a chin strap 16.

At the lower end of the oro-nasal shell 10 in a position which would normally lie below the nose and the mouth of the wearer, the shell is provided with a relatively large opening 17. Affixed in the opening is an annular mounting ring assembly, indicated generally by the reference character 18. The mounting ring assembly consists of several parts, namely an inner sleeve 19 having a flange 20 thereon overlying the inner face of the oro-nasal shell 10 and spaced therefrom by means of a sealing gasket 21. The inner sleeve 19 extends outwardly through the opening 17 and has a threaded exterior to which is attached an outer sleeve 22. On the outer sleeve is a flange 23 which presses against the outer surface of the oro-nasal shell 10 and when threaded tightly against the shell, serves to assure the tightness of

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the sealing gasket 21. These sleeves just described are permanently attached to the shell 10 in the opening 17.

A unit consisting of a valve housing 25, a valve base 26, a bracket 27, and a microphone 28 are interconnected as a single piece for manipulation in connection with the oro-nasal shell.

More particularly, there is provided, in connection with the valve base, a rim 29 around the perimeter of the bottom 30, which gives the valve base a cup-like shape. An extension 31 of substantially conventional form provides means for attaching an air hose or oxygen line 32 to the valve base.

Within the valve base, the valve housing 25 is mounted and secured. The valve housing contains customary check valves of conventional sort details of which are not shown in the interest of clarity and brevity. It will be noted, however, that a passage 34 through the oxygen line communicates with a passage 35, a small portion of which is shown in Figure 2. An exhaust passage 36 is located in the bottom 30 of the valve base.

It is significant to note that there is provided an elastically compressible washer 37 of substantial breadth and thickness which is located in the outer corner of the valve base between the bottom 30 and the rim 29. The rim, moreover, is provided with a bayonet slot 38, the shape of which is clearly shown in Figure 1, and the bayonet slot is adapted to engage a projection 39 on the exterior of the outer sleeve in a customary attachment. Two or more such bayonet connections may be provided. The resiliency of the washer 37 prevents disengagement of the bayonet connection.

It is also of consequence to note that in the cylindrical exterior wall 40 of the valve housing, there is provided an annular sealing recess 41 within which is located an O-ring 42.

It will be noted that ample space is provided between the interior circumference 43 of the outer sleeve and the wall 40 of the valve housing. Through a portion of this clearance, which is annular in shape, air may be exhausted. There is also an appreciable clearance between the inner wall 44 of the inner sleeve and the wall 40 of the valve housing. This clearance is closed at one point by operation of the O-ring 42. The seal, thus formed, is light, though very positive. The inner wall 44 forms a continuous opening through which removable parts are passed.

On an upper edge 45 of the valve housing, there is mounted a somewhat circular leg 46 of the bracket 27. The circular leg 46 has large opening 47 in the mid-portion thereby surrounding the passage 35. A pair of extensions 47' are secured to the circular leg and extend obliquely upwardly therefrom to a shelf 48 upon which is mounted a microphone 49, which may be additionally secured by attachment to a back rest 50. It will be noted that the extensions 47' are relatively light, which makes possible a ready adjustment of the microphone and the shelf upon which it rests in just the proper position which it should occupy immediately in front of the mouth of the wearer when the apparatus is in use. The location of the valve housing, while conveniently near the mouth, is of a less critical character.

Microphone leads 51 may be held in position adjacent the air hose and are shown provided with an attachment 52 to the valve base 26.

As has been previously indicated, the mounting ring, consisting as described of the inner and outer sleeves, is permanently secured to the oral-nasal shell in sealed relationship with respect to the opening 17. The valve base, valve housing, microphone and attaching bracket serve and are handled as a removable unit. To withdraw the unit from the position illustrated in Figures 1 and 2, it is necessary only to disengage the bayonet joint by slight pressure of the valve base toward the shell, followed by rotation sufficient to disengage the projection 39 from the bayonet slot 38. With the valve base thus released, the

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valve housing is slid outwardly within the wall 44 of the inner sleeve, during which movement the O-ring 42 slides freely outwardly. The bracket 27 follows the valve housing outwardly, and inasmuch as all portions of the bracket are smaller than the diameter of the inner wall 44, there is no obstruction to this outward movement. Also, by making the microphone 28 of a size and diameter smaller than the wall 44, the microphone, also, can be readily withdrawn outwardly through the inner sleeve. Both the oxygen line 32 and the microphone leads 51 remain permanently attached to the valve base as does, also, the valve housing, the bracket and the microphone, and hence these portions remain intact as they are disengaged from the mask. Hence the valve housing and its functioning parts together with the microphone continue to remain attached to the equipment at the pilot's station, whereas the mask itself can remain hung by its straps to the pilot's neck and carried with him as a personal possession. By making masks uniform with respect to the mounting ring, and similarly making the unit of uniform size, shape and construction, the units are all interchangeable with the masks so that any pilot with his private mask, who takes the station where the equipment is ready, can immediately connect the equipment to his mask. This is accomplished by inserting the microphone 28 through the opening lined by the inner sleeve, twisting the unit slightly sidewise if need be, whereafter the valve housing is slid into place together with its O-ring while the rim 29 sliding over the exterior of the outer sleeve assists as a guide. By having the bayonet joints at such locations as will permit only a connection in one position, there is no prospect of having the microphone misalign. Moreover, by employment of the clearances heretofore made reference to and the lightly compressible annular seals, an effective seal is assured, but at the same a seal sufficiently light so as not to interfere with disengagement of the unit from the mask whenever needed and reapplication of the unit to the mask on other occasions.

There has accordingly been described herein a compact unitary arrangement of critical elements in a pilot's mask in such an arrangement that they can be retained in the most favorable locations for checking and inspection between flights, the arrangement being such that the pilot is inconvenienced to the least possible degree when taking his personal face mask with him from his station.

While we have herein shown and described our invention in what we have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of our invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A breathing and anesthesia mask apparatus comprising an oro-nasal shell having a face receiving opening, a face gasket seal around the edge of said opening adapted to fit against the face at a location surrounding the nose and mouth, means forming an aperture in the shell, an annular mounting ring assembly sealed at the edge of the aperture and extending outwardly therefrom, a microphone and breathing valve assembly comprising a valve base, a bracket and a microphone mount, a releasable connection between the valve base and the mounting ring assembly having complementary elements respectively on said valve base and said mounting ring assembly, an airtight seal between said valve base and said mounting ring assembly, means forming air passages through said valve base, said bracket comprising a mounting leg on the valve base and an attachment for mounting said leg to the base, a microphone mounting leg, said microphone mount being secured on said last leg and having a breadth smaller than the breadth of said opening, and a connection between said legs positioning said microphone mount at a location opposite the mouth of a wearer when in use,

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said microphone mount and a portion of said valve base being movable into and out of said shell through said opening when said releasable connection is disconnected.

2. A breathing and anesthesia mask apparatus comprising an oro-nasal shell having a face receiving opening, a face gasket seal around the edge of said opening adapted to fit against the face at a location surrounding the nose and mouth, means forming a circular aperture in the shell at a lower portion thereof below the area occupied by the nose and mouth of the wearer when in use, an annular mounting ring assembly sealed at the edge of the aperture and extending outwardly therefrom, said ring assembly having an opening therethrough, a microphone and breathing valve assembly comprising a valve base, a bracket, and a microphone casing, a releasable rotating connection between the valve base and the ring assembly having complementary elements respectively on said valve base and said ring assembly, an airtight slidable seal between said valve base and said ring assembly, means forming inlet

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and outlet air passages through said valve base, said bracket comprising a supporting leg on the valve base surrounding said air passages and a removable attachment for holding said leg on the base, a microphone mounting leg, a microphone on said last leg having a breadth smaller than the diameter of said opening, and an oblique connection between said legs positioning said microphone at a location opposite the mouth of a wearer when in use, an air hose and a microphone line respectively connected to the valve base, said microphone and a portion of said valve base being movable into and out of said shell through said opening when said releasable connection is disconnected.

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